

## **16.0 ENVIRONMENTAL IMPACTS**

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### 16.1 Nonradiological Impacts

#### 16.1.1 Air

Air will be affected by the release to the atmosphere of the following materials:

	#/hr	ton/yr
H2O2 (gas)	.007	.03
CO2 (gas)	73	318.5
Fugitive Dust	.817	3.58
H2O	5.38	2360

These data are presented as worst case scenario in which these materials are introduced into the environment through a single point source. The levels of H2O2, CO2, and H2O emitted are not considered to be harmful by Texas Air Control Board in the amounts emitted. Fugitive dust may be deposited on vegetation or serve as a respiratory irritant, but the levels included in the above emission list do not constitute an amount of fugitive dust considered to be harmful. Radon emanations are not persistent elements of the atmosphere because of radioactive decay. The radioactive effects of these emissions are treated in the following sections.

#### 16.1.2 Land Use Impacts

In the land use description presented earlier in this report, it was noted that the project area is devoted primarily to cattle grazing activities and very limited residential use. Further, no prime farm land exists on the site. Because of this setting, uranium mining would be a compatible land use. The nearest concentration of commercial activities is in Hebbronville, which is approximately six miles south of the project area. The remoteness of the site from residential, commercial, and public land uses adds to its compatibility with adjacent land uses.

During construction and operations, transitory and minimal physical disturbances will occur as well fields are established, and the plant is built. Road construction will also add to the minor disturbance. It was noted in the ecology section that the acreage to be disturbed would have no significant impact on plants and wildlife.

A key beneficial impact of the operation is that it represents a higher economic use of the land. That is, it generates more income per unit area of land than current uses. Because of the higher economic use, local citizens benefit directly (through jobs) and the local public sector benefits as additional revenues. Local land owners will be compensated through lease arrangements. The temporary withdrawal of land from the inventory of current uses (limited cattle production) will have no significant impact. At the end of operations and restoration, land will be returned in a condition that will allow previous land use activities to continue.

#### 16.1.3 Groundwater and Surface Water

Total consumptive use (i.e., net withdrawal) of water from the Oakville Sandstone as a result of mining and restoration will be about 50 x 106 gallons. This withdrawal of groundwater will occur over primarily the life of the restoration phase of the project, approximately 1 year. Potential impacts include lowering of water levels in wells in the Goliad Sandstone in the area.

Local groundwater quality in the Oakville Formation could be impaired by in situ leaching of uranium. Potential impacts from the operation are associated with (1) excursion of leaching fluids, (2) drawing poor quality water toward the site, and (3) improper or incomplete groundwater restoration. The Oakville will be the only aquifer of any importance affected by in situ leaching, and this impact will be local and of short duration since restoration will be performed.

Excursion of contaminants from the wellfield is possible. However, the wellfield will be designed, constructed, and operated such that the occurrence of excursions will be readily identified and corrected.

In general, water quality tends to deteriorate down-dip and with depth. Over-pumping of the wellfield could cause movement of lower quality groundwater to move toward the production zone. This potential impact is considered insignificant because of the low rate of overproduction and the regional trend for water to move from the up-dip direction.

There is a slight possibility that the aquifer cannot be reclaimed to the use category that existed prior to leaching, even though adequate evidence indicates the technical and economic feasibility of the proposed restoration program. If restoration cannot be accomplished, the contaminated water would move slowly (on the order of a few feet per year) down gradient to the east-southeast. The concentration of contaminants would decrease with distance from the site due to dilution or to chemical and physical interaction between the contaminants and host rock.

#### 16.1.4 Mineral Resources

No other mineral resources occur in the area.

#### 16.1.5 Soils

Soil may be impacted at the project by disruption during plant construction and wellfield opening, leakage of the pond liner, and leaks and spills during operations.

Most structures and caliche roads will be placed directly on topsoil. By simply removing these structures and roads during decommissioning, the topsoil will not be impacted.

During wellfield opening, the topsoil will be separated from the subsoil when digging pits. When backfilling, care will be taken to replace the topsoil as it was originally, thereby minimizing any impact on the soil.

The topsoil in the areas of the solar evaporation ponds may be directly impacted in the event of a pond leak. To mitigate this potential impact on soil, the topsoil in the area of the solar evaporation ponds will be stripped and stockpiled. The topsoil will be replaced upon removal of the ponds. Therefore, the ponds will not have any long-term impact on soils.

## 16.2.2 Radioactivity In The Environment

Radon gas will be released to the environment due to the mining activity. The daughter products may be deposited in surface waters, on soils, and on vegetation. Radon daughters are also directly inhaled. The radioactive species which make up Radon-222 decay products are shown in Figure 16-1. Site specific data is not available in sufficient quantity to describe the transfer coefficient appropriate to the accumulation of these daughters in plants and animals on this site.

## 16.2.3 Man

The radiological impacts on man in the Vasquez Project area are divided into two categories: 1) exposure to mine personnel operating in restricted areas within the permit areas and 2) exposure to the general human population in unrestricted areas beyond the permit boundary. The largest contributor to radiation exposure in man will be Radon-222 and its daughters. The impact on man beyond the limits of the permit boundary will not be above those levels considered safe by TDH for unrestricted areas. The radiological impact on man within the permit boundary will be monitored and regulated according to the methodology described in the TDH.

The primary radiological impact on man will be via inhalation pathways. This exposure will be associated with potential radionuclides discharged to the air. These radionuclides are Radon-222 gas and particulate (daughter product) emissions from surge tank vents. The Vasquez facility will not be producing or packaging dry yellowcake. Therefore, emissions of particulate radionuclides other than Radon-222 daughters will not occur.

On-site radiological exposure to operating personnel from airborne Radon-222 and its daughters will be maintained within Maximum Permissible Concentrations (MPC) levels by maintaining work schedules and practices which minimize exposure, and through personnel monitoring and safety programs. No effects have been measured for radiation exposure at these levels.

Ingestion of radionuclides is limited by the nature of the proposed facility. Most ingestion hazards associated with uranium extraction come from contact with yellowcake during the operation of yellowcake drying and packaging facilities. The Vasquez site will not produce dried yellowcake, but rather yellowcake slurry, and no operations producing yellowcake dust will be employed. The exposure risk from ingestion will further be reduced by an employee sanitation and hygiene program which emphasizes reduction in opportunities to ingest radionuclides. No radiological impact is anticipated from this exposure source.

No exposure effects to man are anticipated to arise from transportation of product. The limiting of product to slurries will mean that no yellowcake dust will be deposited on the Vasquez area roads.

Exposure pathways to man are shown in Figure 16-2. The only pathway which may lead to exposures above the levels permitted for unrestricted areas is the inhalation of Radon-222 and its daughters. However, radiological exposure can result from the following points illustrated in Figure 16-2:

- 1) Inhalation Pathway: Inhalation of Radon-222 and its daughters resulting primarily from surge tank venting.

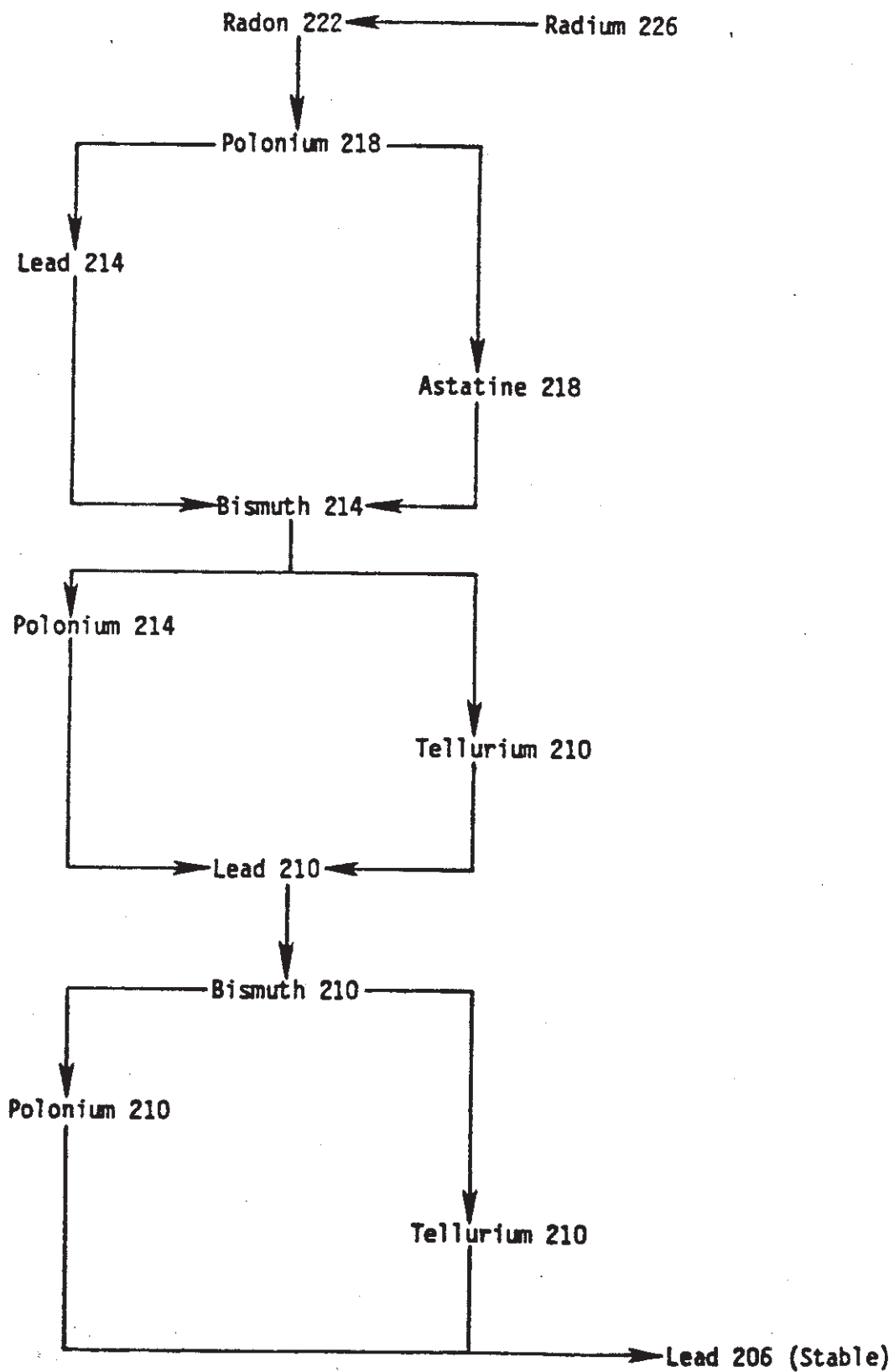


FIGURE 16-1  
Radon 222 and Decay Products

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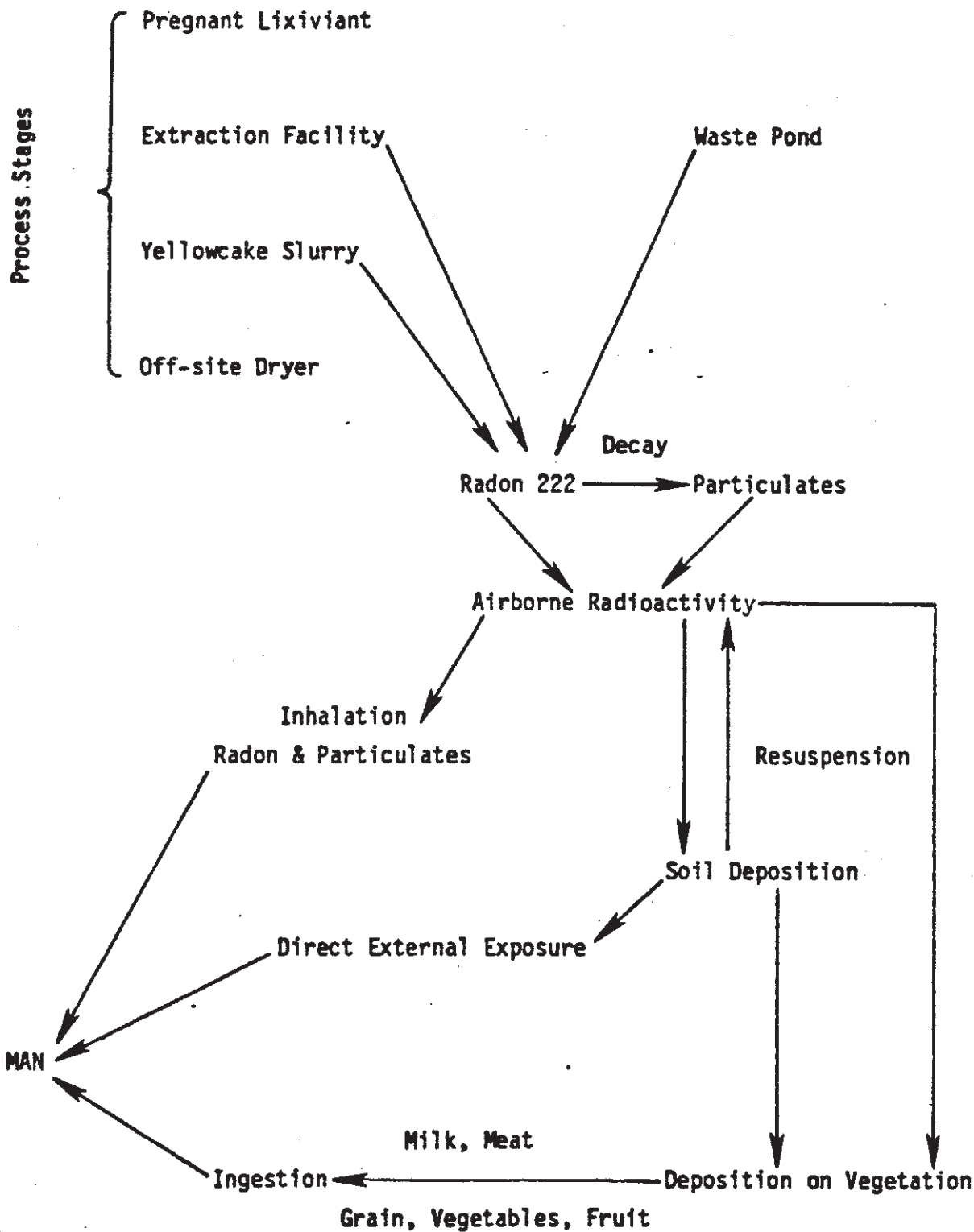


FIGURE 16-2 Exposure Pathways

- 2) Ground Deposition Pathway: Ingestion of radon daughters, uranium and uranium daughters as a result of improper hygiene and/or the consumption of biota which has bio-accumulated materials deposited on the soils of Vasquez or directly on plant leaves.
- 3) Water Consumption Pathway: Drinking contaminated water or consuming biota which have consumed or incorporated such water.
- 4) Direct Exposure: Exposure resulting from proximity to radioactive materials. Exposure to gamma radiation.

As discussed previously, the only pathway where radiological exposure to man is anticipated to exceed levels for unrestricted areas is the inhalation pathway. This pathway will be limited in effect by restricted access to risk areas, radiation safety programs, and regular monitoring programs.

The annual external radiation dose that would be received by individual at the nearest site boundary from direct radiation will not be augmented by the proposed operation. An individual standing at the nearest site boundary will be exposed to the same background levels of direct radiation which he would experience in the absence of the proposed facility.